Mineral Resources Infrastructure Work

NTQF Level -1

Learning Guide -48

Unit of Competence: - Read and Interpret Laboratory Procedures and Specifications

Module Title: - Reading and interpreting laboratory procedures and specifications

LG Code: **MIN MRI1 M13 LO1-LG-48**

TTLM Code: **MIN MRI1 TTLM 0819v1**

LO No4: Locate and identify key features on Geosciences' Laboratory

Instruction sheet	**Learning Guide 48**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics

- Achieving orientations of laboratory procedures
- Identifying and locating key laboratory features
- Gaining access to laboratory
- Identifying services, main features and datum

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Achieving Orientation of the procedures with the laboratory .
- Identifying and locating ***Key features*** of the laboratory.
- Identifying and Accessing to laboratory gained and services, main features and datum .

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 2 to 7.
3. Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish "Self-check 1 up to self-check 4" page 4,7,13 &15 respectively**.**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Achieving orientations of laboratory procedures

1.Introduction In determining when and where to use safety signs, employers must take into account the results of the risk assessment made under the Management of Health and Safety at Work Regulations (the Management Regulations). This assessment should identify hazards, the risks associated with those hazards, and the control measures to be taken. When those control measures have been put in place there may be a significant 'residual' risk such that employees must be warned of any further measures necessary. Safety signs should be used if they will help to further reduce this residual risk. If the risk is not significant there may be no need to provide a sign.

The new rule requires laboratory mine operators to do the following:

- Inventory the chemicals at a mine or mill and determine which are hazardous.
- Keep a list of hazardous chemicals.
- Establish a written hazard Chemical program.
- Prepare a label and Material Safety Data Sheet (MSDS) for its product(s).
- Make sure that containers of hazardous chemicals are labeled.
- Keep a file or book of MSDS's for hazardous chemicals at the mine.
- Train miners about the hazard Chemical program and the hazardous chemicals to which they could be exposed.

Allow miners to look at hazard Chemical program information or give them a copy if requested.

He listed the following questions, which are applicable to the identification of health issues in mining.

- What hazards might be present?
- What potential hazards are present?
- What are the priorities for assessment?
- What levels of exposure and illness are present?
- How bad is it?
- Is it fixed; are the employees well?

2.CODES OF ETHICS

- Do not use any company property for your own benefit.
- Do not engage in any transaction which does not have a genuine, legitimate business purpose.
- Ask yourself whether any contemplated transaction or business practice would withstand the inspection of the public eye if exposed.
- Do not do anything which could require you to be untruthful.
- Seek advice when in doubt.

3. SAFETY BEGINS WITH YOU

- It is your responsibility to conduct experiments safely
- Evaluate the risks of your processes.
- Establish Standard Operating Procedures (SOPs)
- To help evaluate these risks use:

1. Your advisor
2. Technicians

3.1Know your surroundings Before you begin lab work know the location of Safety Shower(s), Eyewash(s) **,** Fire Extinguisher(s) and Fire Exits

3.2Personal Protective Equipment (PPE) Evaluate your risks and determine the proper PPE

Examples of PPE: Lab Coat, Eye Protection, Gloves, Apron and Face shield

3.3Standard Operating Procedure (SOP) An SOP is a document establishing a procedure for working with hazardous chemicals or processes in a laboratory. A hazardous chemical is one that has a hazardous characteristic such as:

• Flammable	• Corrosive
• Carcinogen	• Toxic
• Radioactive	• Reactive
• Cryogenic	• Inhalation hazard
• Oxidizer	• Explosive

The hazards of a chemical can be obtained from labels, Material Safety Data Sheets and other references. Benefits of an/ SOP/ standard operating procedures

- Tells lab personnel clearly how to use hazardous chemicals
- A good document for training
- Incorporates safety protocols into the regular steps to an experiment
- Eliminates guesswork for workers for safety decisions such as glove selection, use of fume hood, waste determination, etc.
- People are more likely to follow a protocol when it is in writing.

Types of SOPs – each is discussed in detail later SOPs can be written to best serve the lab. Some examples are:

- For a class of chemicals such as corrosives or flammables
- For a list of chemicals to be handled in a similar way
- Procedural – covers steps of an experiment and the chemicals used in it
- Chemical specific SOPs

Self check 1	Written test

Name _____ **Date**_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 say true or false the following questions each 2 points

_____ 1. Before you begin lab work know the location of Safety.

_____ 2. People are more likely to follow a protocol when it is in writing.

_____ 3. Use any company property for your own benefit

_____4. One of benefits an/ SOP/ standard operating procedures is a good document for training

_____5. The hazards of a chemical can be obtained only from labels

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6points**

Score = _____

Rating: _____

Information Sheet-2	Identifying and locating key laboratory features

2.Introduction:- Department of Mining and laboratory Engineering is must identifying and locating laboratory features to understand the operator/technician of the mining lab. the location of laboratory equipment easily handled without hazard. the minimum requirement to know the operator of laboratory mining list below

- Laboratory Orientation and Safety Guidelines
- Personal Protective Equipment (PPE)
- Evaluate your risks and determine the proper PPE

A. Gloves-not all created the same

- Different gloves for different reasons
- Know which is right for your needs
- Choosing a glove (Resources) Best to check more than one

B. Fume hood operation Why you cannot work on the sash when working in the laboratory must follow the laboratory features the listed below define in figure

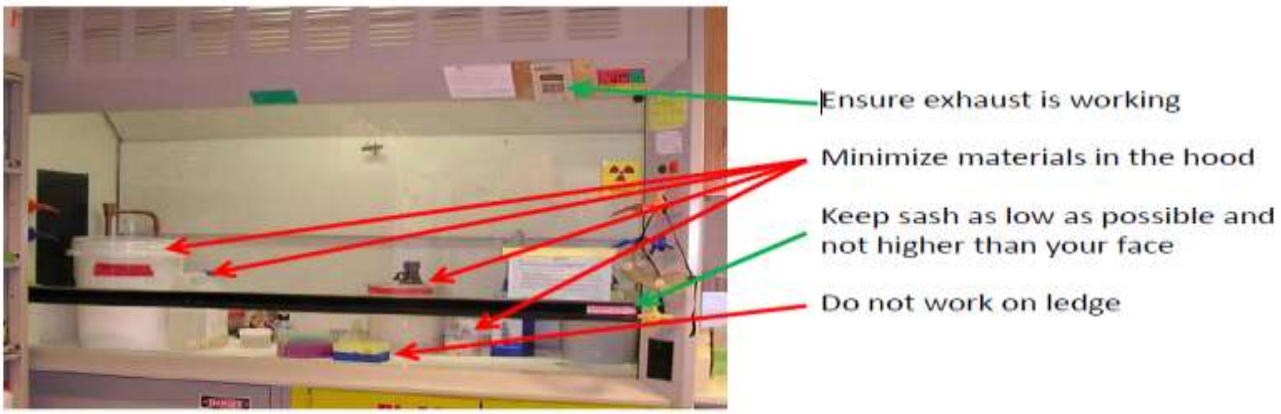

Fig 2.1 Fume hood operation

Lab equipment manufacturers are working with lab managers and planners to develop and implement systems that meet the performance requirements for job and the operating requirements for lab managers to maintain efficient and cost-effective working environments. Five of these key lab design features include:

- sustainability to function in today's ecological and green environment;
- energy efficiency to minimize operating costs;
- flexibility to accommodate the rapidly changing technical and business environments;
- interdisciplinary capabilities to support the rapid development of new products and processes; and
- attractive functionality to support recruitment efforts and the installation of state-of-the-art analytical tools. Integrating all of these features into a single environment then becomes the challenge for the lab managers and planners.

In many lab equipment areas, centralized, large hard-wired (or plumbed) systems that once were considered the more economical choice are now being replaced with smaller, more modular point-of-use systems that can accommodate more stringent flexibility and cost effectiveness requirements that are now needed. Excess capacity is being replaced with the more immediate minimalist approach, while the Japanese “kanban” or “just-in-time” approach, so successfully applied to laboratory, has now been applied to investigate lab resources and results.

C. General guide line laboratory features:- The following factors are to be considered when developing spill response procedures

- Categories of chemicals eg oxidizers, flammable solvents and their chemical, physical and toxicological properties.
- The quantities that may be released
- Possible locations of released /eg laboratory corridor
- Personal protective equipment needed
- Types and quantities of neutralizing or absorbing material needed

Self check 2	Written test

Name _____ Date_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 Choose the best answer from the following questions each 1 pionts

1. the minimum requirement to know the operator of laboratory mining is

A. Laboratory Orientation and Safety Guidelines B. Personal Protective Equipment (PPE)

C. Evaluate your risks and determine the proper PPE D. All

2. Lab managers and planners to develop and implement systems in mining laboratory

A. meet the performance requirements B. operating requirements

C. maintain efficient and cost-effective working D. All

3. when working a Fume hood operation.

A. ensure exhaust is working B. do not work on a ledge C. minimize material in hood D. all

4. Chemicals can be Categories

A. oxidizers B. flammable solvents and their chemical C. physical D. toxicological properties E. All

Note: **Satisfactory rating - 2 points** **Unsatisfactory - below 2points**

Score = _____

Rating: _____

Information Sheet 3	Gaining access to laboratory

3. Introduction A laboratory result is interesting if it is easily understood by humans, valid on new or test data with some degree of certainty, potentially useful, original, or validates some assumption that a user seeks to confirm. the other Introduction to their function, chemical components, and potential danger , Storage and handling and Standard operating procedure for etching.

Wash thoroughly after handling any contaminated material, chemical, or waste. All chemical containers must have a legible, firmly attached label showing the contents of the container. Labels on incoming containers of hazardous chemicals must not be removed or defaced. Any labels that are damaged must be immediately replaced with labels containing the same identification, warnings, and source information.

A hazard review of new materials not previously used in the laboratory must be completed under the direction of the supervisor/manuals before actual handling of the material begins. Chemical substances (or by-products) developed in the laboratory are assumed to be hazardous in the absence of other information.

Store all chemicals in a tightly closed, labeled container, in a cool, dry, well ventilated area and Segregate from incompatible materials. Secondary containers must be labeled clearly. Follow any substance-specific storage guidance provided in Safety Data Sheet documentation. Use small quantities whenever possible. Monitor your inventory closely to assure that you have tight control over your material

3.1. Chemical Handling any technician must know access of the laboratory chemicals and equipment from the supervisor and manuals.

3.1.1.**Chemical Handling (Transportation)** during chemical transportation in the laboratory use the right equipment and method of transportation to prevent hazard in the work place.

fig 3.1 chemical mining transpotration

3.1.2. **Chemical Handling/ Label chemicals/** in the laboratory chemical handling is very critical /necessary /.the use of chemical label is easily to know the equipment wherever the use in the laboratory due to this minimize hazard in the laboratory.

- Store with compatible chemicals

- Store in proper container
- Store in air-tight container
- Important to separate incompatible chemicals
- Check for expiration dates of some chemicals

Example: Chlorine and ammonia (Chlorine gas and possibly hydrazine, Chlorine was a weapon
Example: Copper and H2O2, strongly reacts produces O2, could build pressure in a vessel.

fig 3.2a label chemicals

fig 3.2b label chemicals

3.1.3. **Chemical Handling (Waste)** the operator/laboratory technician should know different type of waste and regulation of the waste in the laboratory to minimize hazard

- Place in properly-labeled waste container
- Mix only compatible chemicals in waste container
- Dispose of waste container by contacting Monique or Robert.
- Different disposal containers and regulations for different forms of waste.
- Besides the standard disposal containers, you can use others, not provided (required for certain chemicals).

3.1.4**. Spills and clean up (small and large spills)** in the mining laboratory Anticipate spills, prepare for them ahead of time. You and your advisor are responsible for this. Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible,

confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

In case of spill Safety Showers:- Walk quickly (do not run) to safety shower Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. Notify supervisor immediately

fig 3.3 way of wash during spill

Eye wash in case of spill Walk to eyewash Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention Notify supervisor and immediately.

fig3.4.washing face

3.2. Materials Safety Data Sheets (MSDSs)

- List the hazards and precautions which should be taken with a chemical
- Required for each chemical in your lab
- Located online my lab.

A. Laboratory Safety Personal Protective Equipment

Lab Coat Policy

- To be worn in all labs in which work
- Should be stored in the lab, not in your office
- Exception: transporting chemicals to another lab
- Lab coat laundering service

Chemical gloves

- Should be worn when working in laboratory
- Must be removed when leaving the lab and/or when handling common surfaces (e.g., door knobs)
- How to choose

Others

- Safety glasses
- Respirators
- Special protection for handling hot substances

B. Laboratory Safety Ventilation Fume hood operation, there are two types Diagram of ventilation system which is listed below.

- Offices: positive pressure
- Labs: negative pressure

Laboratory Safety Lab Safety Orientation Checklist

- Explain function
- Explain when it should be used, who keeps it, etc.

3.3. Getting to know the laboratory Building every worker of the laboratory should know the work station safety area before going to the laboratory work shop of work station to escape out when the hazard happen.

- Photo of exterior of laboratory Building
- Photos of major entrances?
- Floor plans and explanation of which spaces belong to this work area
- Evacuation routes and staircases
- Locations of safety showers (including washroom showers) and eyewash stations

Self check 3	Written test

Name _____ Date_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 true or false the following questions each 1point

_____ 1. Laboratory result is interesting if it is easily understood by humans

_____ 2. Every worker of the laboratory should know the work station

_____ 3. Mix only incompatible chemicals in waste container

_____ 4. Chemical gloves must be removed when leaving the lab and/or when handling common surfaces (e.g., door knobs)

_____5. One of the chemical handling is check for expiration dates of some chemicals

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Score = _____

Rating: _____

Information Sheet-4	Identifying services, main features and datum

4. Main mining laboratory features is may manage their hazards with a document that is less complex than one needed for a more complex mine, but it must contain the mandatory elements of an SMS . In practice, this will It is your responsibility to ensure that your actions do not jeopardize your safety or that of other members of the Department. It is essential that you understand how to operate equipment properly and that you observe required laboratory practices. Familiarize yourself with this general procedure, addressing general safety and health requirements for work in the laboratory, as well as the specific handling requirements included in the SOP for each specific hazard class and/or process that you will be working with. For these reasons, before starting work you must ensure that you have attended the

appropriate training and that you have received relevant instructions from your Supervisor. If at any time you are unsure of the correct procedure, contact your Laboratory Manager before starting work. probably in mining laboratory establishing an SMS with the following components.

- Health and safety policy
- Operating procedures
- Maintenance programs
- Risk management
- Incident management
- Emergency plan
- Direction structure and responsibilities
- Training and competence
- Communications
- Record management

In the mining environment, the effects of health can be deadly in specific work situations. mining listed several factors that influence occupational health loss. These factors include the following.

1. Age of employee.
2. Pre-employment hearing, seeing impairment.
3. Diseases of the ear, eye etc.
4. Sound pressure level of the noise.
5. Length of daily exposure.
6. Duration of employment.
7. Ambient conditions of the workplace.
8. Employee life style outside the workplace

Lab equipment manufacturers are working with lab managers and planners to develop and implement systems that meet the performance requirements for researchers and the operating requirements for lab managers to maintain efficient and cost-effective working environments. Five of these key lab design features include:

1) sustainability to function in today's ecological and green environment;

2) energy efficiency to minimize operating costs;

3) flexibility to accommodate the rapidly changing technical and business environments;

4) interdisciplinary capabilities to support the rapid development of new products and processes; and

5) attractive functionality to support recruitment efforts and the installation of state-of-the-art analytical tools. Integrating all of these features into a single environment then becomes the challenge for the lab managers and planners.

4.1.laboratory services:- The role of laboratory and testing services in the mining industry Requirements for laboratory services in different branches in mining operations are indeed diversified and include analysis of exploration, grade control, process control and end product samples i.e. party/umpire assays as well as monitoring of environment and side products. High-quality and efficient testing is one of the most sensitive technical support services in mining operations. Accurate, confident and timely analyses are critical for optimization of mining and metallurgical processes as well as environmental monitoring.

Evaluating and testing processes are complicated and necessitate active maintenance and continuous development with highly professional staff. However laboratory and testing services are not considered as core processes in the mining industry and consequently the development of resources and The operator is responsible for the quality, safety, health and liability issues of the services.

4.2 laboratory datum:- laboratory datum meaning a given, or that which we take for granted and use as the basis of our calculations. This meaning is carried in word for statistical data. We ordinarily think of data as derived from measurements from a machine, survey, census, test, rating, or questionnaire most frequently numerical. In a more general sense, however, data are symbolic representations of observations or thoughts about the world.

Self check 4	Written test

Name _____ **Date**_____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part 1 choose the best answer each 1 points

1. contact your Laboratory Manager before starting

A. true B. False

2. The laboratory operator is responsible

A. quality B. safety C. health D. liability issues of the services E. All

3. However laboratory and testing services are not considered as core processes in the mining industry

A. True B. false

Note: **Satisfactory rating - 2 points** **Unsatisfactory - below 2 points**

Score = _____

Rating: _____

List of Reference Materials

1. safety and health in open cast mines international labor office Geneva
2. Draft code of practice on safety and health in opencast mines (Geneva, 16–20 October 2017)
3. www.resourcesandenergy.nsw.gov.au/safety
4. WA Department of Mines and Petroleum www.dmp.wa.gov.au